Dynamic Chiropractic

VITAMINS / SUPPLEMENTS

Calcium Supplementation Increases Bone Density in Teenage Girls

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Osteoporosis is a significant health concern that now affects one in four women by age 50. Women are at higher risk than men of developing osteoporosis as a result of lower peak bone mass and rapid bone loss after menopause, which stems from a decline in estrogen and progesterone secretion. Several studies have shown that high adult peak bone mass is protective against osteoporotic fractures later in life, and that higher intake of calcium in early adult life can enhance bone density and thereby reduce risk of future development of osteoporosis.

It has been challenging to establish the levels of calcium, however, that are appropriate for teenage girls who are postmenarcheal (have had their first menstrual cycle). In recent years, several studies have reported a positive effect of calcium supplementation on bone mass in children and adolescents. In the November 2003 issue of the *American Journal of Clinical Nutrition*, G. Rozen and fellow researchers published a study showing that supplementation with 1,000 mg per day of calcium carbonate for one year significantly increased bone mineral density in a group of 49 American teenage girls, compared to 51 age-matched controls who received a placebo. All the girls in the study were at least two years past the onset of menarche (mean age: 14), and had a habitual calcium intake of less than 800 mg per day. Results showed that a positive effect of calcium supplementation on bone accretion was achieved at an average calcium intake of 1,200 mg per day: 500 mg from the diet plus 70 percent compliance with the supplement (700 mg per day).

Various studies have shown that American teenage girls have an average intake of calcium considerably lower than 1,200 mg per day. This suboptimal calcium intake is a significant factor in future onset osteoporosis, as the 12-24 age group represents the period in which individuals can most rapidly acquire bone mineral density. As such, it is important to maximize bone accretion during this genetic growth phase by ensuring that all postmenarcheal teenage girls consume at least 1,200 mg of calcium per day from a combination of food and supplements.

Health practitioners should routinely perform dietary surveys on female patients ages 12-24 to establish their habitual calcium intake levels from food sources, and help those with suboptimal levels identify good food sources of calcium. However, studies show that teenage girls do not demonstrate ideal compliance with dietary recommendations aimed at preventing the future onset of degenerative diseases that may occur 40 years later or more. Thus, the consideration of a calcium supplement offers a convenient option to help ensure that bone accretion rates will proceed during these years in a manner that is conducive to the future prevention of osteoporosis.

Of note is the fact that calcium carbonate and calcium citrate both offer the same bioavailability when taken with meals (approximately 40 percent absorption). In the Rozen, et al., study, calcium carbonate chewable tablets were used, and compliance over the one-year study period was 70 percent. This is a very good compliance level for this age group. The calcium carbonate supplement was shown to significantly increase total body bone mineral density at six months and 12 months, as assessed by dual-energy X-ray absorptiometry.

A number of holistic health practitioners are reluctant to recommend the use of calcium carbonate, due to an erroneous belief that all calcium carbonate supplements are nonabsorbable, or that they form stones within the gastrointestinal tract. Many studies have shown that use of calcium carbonate is an effective means to increase bone density and slow calcium loss from bone throughout the life cycle. It has also been shown to be the most cost-effective form of calcium, yielding the greatest amount of elemental calcium per tablet, at the lowest price to the consumer.

Unfortunately, a number of nutritional supplement companies have distorted the science on this subject to suggest that only more expensive forms of calcium can be used to prevent osteoporosis, such as microcrystalline hydroxyapatite (MCHC), calcium citrate, calcium citrate-malate, coral calcium, etc. Research in this area does not support using these more expensive forms of calcium in place of calcium carbonate if cost-effectiveness is considered. Much of the marketing hype surrounding more expensive forms of calcium increases profits for the supplement companies who put them into the marketplace, but evidence continues to show that calcium carbonate works and is cost-effective. A standard search of the available research indicates that to date, the greatest number of human intervention studies performed to investigate the effect of calcium supplementation on bone density outcomes have used calcium carbonate supplementation. By comparison, only a handful of studies have been performed using the alternate forms of calcium supplementation noted above.

In conclusion, health practitioners should seize the opportunity to assess the dietary calcium status of female patients ages 12-24 to help them optimize bone accretion during this sensitive genetic phase. This is related to the fact that bone mass can be gained faster during this phase of life than at any other time in the life cycle. In most instances, calcium supplementation will help compensate for the common finding of insufficient calcium intake (less than 1,200 mg per day). Many forms of calcium available in the marketplace have a bioavailability value of 30 percent to 40 percent when taken with meals. Of these, calcium carbonate has been shown to be the most cost-effective. Its only drawback is that it is less soluble than calcium citrate; therefore, calcium citrate may be more appropriate for patients with a previous history of kidney stones, although this still remains speculative. In terms of calcium overdose, it is well-established that as much as 2,000 mg of calcium per day can be consumed safely from the combination of diet and supplementation without producing any unfavorable side-effects.

Reference

1. Rozen G, Renneri G, Dodiuk-Gad R, et al. Calcium supplementation provides an extended window of opportunity for bone mass accretion after menarche. *Am J Clin Nutr* 2003;78:993-8.

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